enter a chiller within 1 hour and chill at the same rate as carcasses.

This proposal also would amend section 381.66 of the poultry regulations so they are substantially consistent with the proposed meat inspection regulations regarding temperature and chilling requirements. Section 381.66 currently requires that all poultry slaughtered and eviscerated in an official establishment be chilled immediately after processing so that the internal temperature is reduced to 40 °F or below within a time period appropriate to the size of the carcass. It further requires that eviscerated poultry to be shipped from the establishment in packaged form be maintained at 40 °F or below, with certain exceptions. Section 381.66 would be amended to include new time/temperatures requirements, to mandate corrective actions when time/ temperature controls fail, and to eliminate other provisions inconsistent with those being proposed for meat. FSIS believes the proposed timetemperature cooling requirements for meat are equivalent to those in effect and being proposed for poultry in terms of their public health benefits and are readily attainable under current commercial conditions.

Time-Temperature Requirements

FSIS is proposing that establishments cool the surface of meat carcasses to 50 °F or below within 5 hours and to 40 °F or below within 24 hours from the time that carcasses exit the slaughter floor. This cooling rate is based on the best estimate of what is needed to minimize multiplication of pathogenic organisms and what is achievable in a wellcontrolled meat establishment. Controlling the surface temperature also ensures that the interior is cooling at a reasonable rate.

Carcasses and raw meat products would be required to be maintained at an internal temperature of 40 °F or below during handling, holding, and shipping. FSIS considered a higher temperature limit because at temperatures below 50 °F, spoilage bacteria generally multiply faster than pathogens. Thus, meat below 50 °F generally will spoil before excessive pathogenic bacterial multiplication can occur. For example, spoilage bacteria, such as Pseudomonas spp., Pediococcus spp., and Lactobacillus spp., not only increase faster than pathogenic bacteria, below 50 °F, but some also form inhibitory compounds. However, FSIS rejected a higher temperature limit and is proposing 40 °F because: (1) The lower temperature provides an additional margin of safety against the multiplication of pathogenic bacteria,

(2) 40 °F has long been the maximum temperature recommended, as set forth in Agriculture Handbook No. 412; (3) the U.S. industry generally uses much lower temperatures (e.g., 30 °F (-1.1 °C) to retard spoilage as well); and (4) 40 °F would be the same as the temperature currently required for chilling poultry products (9 CFR 381.66).

Except for hot-boning operations, where muscle tissue is removed from the carcass before cooling, FSIS is not proposing a set time to attain an internal temperature of 40 °F. This is because, when the surface temperature of a product reaches 40 °F within the proposed 24 hours and is maintained at that temperature, the laws of thermodynamics ensure that the interior will cool to a safe temperature within a reasonable time frame. Since carcass weight and composition affect the interior cooling rate, a set time to an internal temperature would be too strict for heavy carcasses and too lenient for light carcasses

There are additional reasons to use surface temperatures. First, any bacterial pathogens on a fresh carcass are concentrated on its surface. The deep tissue of carcasses, with few exceptions, is sterile. Thus, the control point should be where the potential hazard exists. Second, the surface is the most prudent place to measure temperatures. Probing the deep muscle tissue of carcasses before they are fully cooled could cause a public health problem by injecting any bacterial pathogens on the surface into the sterile warm interior.

Hot-boned product, however, would be controlled by internal temperature. Cutting into the carcass increases the probability of deep tissue contamination due to tears in the muscle facia, flexing, punctures, and additional handling. Therefore, the internal temperature is the critical control point. And, since the integrity of the carcass has been violated, the internal temperature is the appropriate monitoring point.

The proposed cooling rates, holding temperature, and corrective actions specified in the proposed rule are based primarily on the thermodynamics of cooling meat and the effect of temperature on bacterial multiplication. Further information on how these were calculated is available in "The Scientific Basis for Proposed Time-Temperature Requirements," a paper on file in the FSIS Docket Clerk's office and available upon request from Director, Processed Products Inspection Division, FSIS, U.S. Department of Agriculture, Washington, D.C. 20250.

This proposed rule would also require that carcasses and raw meat products reach a temperature of 40 °F or below prior to leaving the establishment. Requiring a temperature of 40 °F or below prior to entering commerce provides added assurance that during transportation the product will be maintained at 40 °F and bacterial multiplication will be restricted. Carcasses or raw meat products are permitted, however, to enter a ready-toeat process at the establishment, before being cooled to an internal temperature of 40 °F.

Slaughtering establishments would be required to begin cooling raw meat products other than carcasses within 1 hour of removal of the tissues from the carcass. Establishments generally remove raw meat products, such as livers, hearts, heads, and cheek meat, before the carcass exits the slaughter floor. These products have a history of poor microbiological quality because the products are packed in boxes before cooling or are moved to the cooler only after a delay. The requirement that cooling of these products begin within 1 hour of removal from the carcass would reduce the opportunity for pathogenic bacterial multiplication and improve the microbiological quality of these products. The cooling rate proposed for these products is the same as that for the carcass surface-50 °F within 5 hours and 40 °F within 24 hours

The method used to measure the surface temperature of a carcass or a raw meat product would be at the discretion of the establishment. Pressing the side of a temperature probe against the meat surface is the easiest and most inexpensive method. Because air has low heat capacity relative to meat, this method should give a good estimation of the meat surface temperature. Shielding the probe from room air should increase the measurement accuracy. For shielding, one suggestion is to place two carcasses together and measure the contacting surfaces. Shielding the probe from room air with a food contact material having low heat conductance and capacitance, such as a dry sponge in a plastic bag, after proper sanitizing, would also be effective.

The time-temperature profiles being proposed might be modified for certain raw products if other factors such as dryness or acidity are factored in. Therefore, it is possible that an establishment's designated processing authority could develop alternative time and temperature procedures for cooling, shipping, receiving, and, or holding carcasses and raw meat products that would produce microbial profiles equivalent to or better than those produced under the proposed requirements. The Agency is therefore